

The Journal of the American Association of Zoo Keepers, Inc.

AAZK Animal Keepers' Forum



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MISSION STATEMENT

American Association of Zoo Keepers, Inc.

The American Association of Zoo Keepers, Inc. exists to advance excellence in the animal keeping profession, foster effective communication beneficial to animal care, support deserving conservation projects, and promote the preservation of our natural resources and animal life.

ABOUT THE COVER

This month's cover photo comes to us from Kelsey Eggers of the Denver Zoo and features two fishing cats (*Prionailurus viverrinus*). Fishing cats live up to their name. Fishing cats are great swimmers and have adapted to hunting in marshy areas of Southeast Asia. They have been observed in the wild "fishing" at the edges of bodies of water. They appear to scoop their prey from the depths of the water with their partially-webbed paws, and have also been observed playing with fish in shallow water. Fishing cats are best described as piscivores-predominately feeding on fish and shellfish.

The conversion of wetland and floodplain habitats to agriculture has reduced the habitat of this species throughout its range. Southeast Asian wetlands are disappearing as the human population grows. These wetland areas are affected by pollution, over-farming and the use of chemical fertilizers at farms that drain into wetlands, over-fishing by humans, and drainage issues. These cats have also been subject to poaching, they are often hunted for food, medicine, or various body parts.

Articles sent to *Animal Keepers' Forum* will be reviewed by the editorial staff for publication. Articles of a research or technical nature will be submitted to one or more of the zoo professionals who serve as referees for AKF. No commitment is made to the author, but an effort will be made to publish articles as soon as possible. Lengthy articles may be separated into monthly installments at the discretion of the Editor. The Editor reserves the right to edit material without consultation unless approval is requested in writing by the author. Materials submitted will not be returned unless accompanied by a stamped, self-addressed, appropriately-sized envelope. Telephone, fax or e-mail contributions of late-breaking news or last-minute insertions are accepted as space allows. Phone (330) 483-1104; FAX (330) 483-1444; e-mail is shane.good@aazk.org. If you have questions about submission guidelines, please contact the Editor. Submission guidelines are also found at: aazk.org/akf-submission-guidelines/.

Deadline for each regular issue is the 3rd of the preceding month. Dedicated issues may have separate deadline dates and will be noted by the Editor.

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*Consider nominating
your coworkers for
an AAZK Award in
recognition of their
hard work.*

The pandemic has stretched on for almost a full year now, but the vaccine on the horizon now allows thoughts of the future for the first time in a long time as well as the opportunity to reflect on the difficulties and perseverance that underscored 2020. The AAZK Grants and Awards Committees hope to provide recognition and assistance to our members as they seek to move forward into a brighter future.

The financial implications of the pandemic have impacted not only individuals, but also animal care and conservation institutions. The Grants Committee and their partner Committees and Programs want to provide financial assistance to those in need as they seek to develop professionally and advance their goals. The following grants are proudly offered to AAZK members:

AAZK PROFESSIONAL DEVELOPMENT GRANT: Assist AAZK Professional members with the costs associated with attending conferences, workshops, etc., not associated with the AAZK National Conference.

AAZK PROFESSIONAL DEVELOPMENT GRANT: AAZK National Conference: Assist AAZK Professional members with the costs associated with attending a National AAZK Conference.

AAZK AFFILIATE MEMBER GRANT - AAZK NATIONAL CONFERENCE: Assist AAZK Affiliate members with the costs associated with attending a National AAZK Conference.

AAZK RESEARCH GRANT: Encourage and support efforts in non-invasive research conducted by AAZK members in zoological parks and aquariums around the world

AAZK CONSERVATION, PRESERVATION, AND RESTORATION GRANT: Encourage and support efforts in conservation conducted by AAZK members in zoological parks and aquariums around the world

Many professionals have stepped up in the face of the pandemic and performed exemplary work in a number of different categories. Consider nominating your coworkers for an AAZK Award in recognition of their hard work. The full list of Awards offered by AAZK are on the website, but a few to highlight given the unique strategies many professional and institutions have employed due to COVID are:

JANET MCCOY EXCELLENCE IN PUBLIC EDUCATION: Recognize great work in connecting the public with animals and conservation through institutional message delivery

LEE HOUTS ADVANCEMENT IN ENVIRONMENTAL ENRICHMENT: Recognize outstanding keeper-initiated contributions to the art and science of environmental enrichment

NICO VAN STRIEN LEADERSHIP IN CONSERVATION: Recognize member-initiated contributions to the conservation of wildlife and their habitats

We are beginning to see a light at the end of the tunnel for the pandemic so be sure to look forward to the future and back to the past and think of AAZK Grants and Awards in the coming months!

Cheers,

Paul
Paul.Brandenburger@aazk.org

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CALL FOR NOMINATIONS

AAZK

Board of Directors

The American Association of Zoo Keepers (AAZK) is seeking nominations for three (3) positions on the AAZK Board of Directors. Each candidate shall be nominated by a Professional peer within AAZK. Qualified candidates shall be active Professional Members in good standing with AAZK. AAZK Bylaws require that a Board Member have the title of Animal (Zoo) Keeper or similar and if in a supervisory role at their facility, maintain daily husbandry contact with the animal collection. AAZK reserves the right to contact the candidate's employer to verify candidate job duties conform to AAZK policy. The electronic voting period to elect Board Members to the Association will be open from **May 1, 2021 to June 1, 2021** on the AAZK website.

The Letter of Nomination shall include a brief synopsis of candidate work history, previous experience within AAZK and detail the number of years within the Profession.

Deadline for Nominations to the AAZK Board of Directors shall be postmarked or emailed prior to midnight FEBRUARY 28, 2021.

**NOMINATIONS CAN BE SENT TO
ED.HANSEN@AAZK.ORG OR MAILED TO:**

Ed Hansen, CEO/CFO
AAZK
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PREFERRED EXPERIENCE:

Experience as an officer in an AAZK Chapter, Committee Chair, or Conference Chair. Excellent organizational and time management skills, coupled with the ability to meet tight deadlines; problem solving and motivation of subordinates and quality public speaking skills.

REQUIREMENTS:

Each elected candidate shall be required to attend monthly electronic meetings of the AAZK Board of Directors, read and answer daily electronic communications, supervise the work of Committees and/or Program Managers and shall be required to attend the annual AAZK Conference. An elected candidate can expect to commit anywhere from 4-6 hours per week in the performance of AAZK Board duties.

NOMINATIONS:

A Letter of Nomination shall include:

- Name of Candidate
- Zoo Affiliation
- Zoo Position Title
- Contact Information (address) including a phone number
- E-mail address

Reminder – AAZK Professional Members

AAZK BOARD OF DIRECTORS ELECTRONIC VOTING

Candidate profiles for election to the AAZK Board of Directors may be viewed at AAZK.org beginning **April 1, 2021**.

Professional Member electronic voting for candidates to the AAZK Board of Directors will open on the AAZK website (www.aazk.org) on **May 1, 2021** and will close at midnight **June 1, 2021**.

CALL FOR NOMINATIONS 2021 AAZK AWARDS

The American Association of Zoo Keepers (AAZK) Awards Committee is accepting nominations for awards listed to the right, which will be presented at the 2021 AAZK Conference in Los Angeles, CA.

**THE DEADLINE FOR NOMINATIONS
IS MAY 1, 2021.**

Information concerning the qualifications, nomination procedure, selection procedure and an explanation of the awards may be obtained at www.aazk.org, under committees & programs/awards committee.

LIFETIME ACHIEVEMENT AWARD

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EXCELLENCE IN EXHIBIT RENOVATION AWARD

JANET MCCOY EXCELLENCE IN PUBLIC EDUCATION AWARD

NICO VAN STRIEN LEADERSHIP IN CONSERVATION AWARD

**LEE HOUTS ADVANCEMENT IN ENVIRONMENTAL
ENRICHMENT AWARD**



An Ever-Changing Climate: The Role of Zoos in Climate Change Education

Mary Fields
Graduate Student, Project Dragonfly
Miami University

Zoos and Climate Change

In modern times, zoos and aquariums have become educational facilities where guests learn about science in an informal and enjoyable setting (Kelly et al., 2014). While zoos and aquariums used to be seen as menageries for looking at exotic animals, they are now viewed as an educational experience that can reach millions of people per year. Along with the millions of guests entering zoo gates every year, millions are also being engaged on zoo and aquarium social media platforms. This engagement includes over 16 million Facebook followers, 1 million Twitter followers and hundreds of thousands of followers on other platforms (Visitor Demographics, n.d.). If utilized appropriately, this educational experience has the potential to make people more conscientious about their carbon footprint and reflect on how they can help combat climate change.

Zoos and aquariums have banded together in recent years to combat climate change. From 2013 to 2015, the AZA and EAZA banded together to create the Pole to Pole Campaign. A total of 251 zoos and aquariums from around the world collaborated for this effort. The goal of this campaign is to help combat climate change as well as to educate guests to do the same. Zoos and aquariums that partook in this campaign focused on running a carbon-neutral campaign (reducing and offsetting carbon emissions), the engagement of world leaders to reduce carbon dioxide emissions and the inspiration of other zoos, visitors and schools (Pole to Pole, 2018). Although the campaign ended in 2015, many facilities continue these practices through their education efforts and improving facilities to diminish carbon emissions.

Individual facilities are taking steps to combat climate change, as well. The Cincinnati Zoo & Botanical Garden was proclaimed the “Greenest Zoo in America” in 2010 for their use of green building, renewable

energy, water conservation and other sustainable acts (The Cincinnati Zoo & Botanical Garden). The Cincinnati Zoo also provides tips to their visitors on how to become sustainable themselves, including several resources on their website. Some of these tips include becoming vegetarian, shopping locally, reducing food waste and using alternate transportation, such as biking, riding public transportation and carpooling. Since 2006, the Reef HQ Aquarium in Queensland, Australia has reduced their energy consumption by 50% through adjustments to their air conditioning, pumps and filtration systems, lighting, air leaks, insulation and building management (Reef HQ, 2014). This goal was set to become an example to the public on how to minimize emissions and protect the Great Barrier Reef from climate change. Ways to reduce energy consumption, such as painting your roof a lighter color to reflect sunlight in warmer locations, is shared by the docent and interpreter staff at the aquarium, on the aquarium's website and even with video calls to schools. Some facilities, such as the Point Defiance Zoo & Aquarium in Tacoma, Washington, are Arctic Ambassador Centers. These centers help provide sustainable resources for local communities and aid Polar Bears International, a research program studying polar bears in the wild (Point Defiance Zoo & Aquarium). Point Defiance also provides resources for teachers on their website and links to other sites for videos on climate change, statistics on the earth's current state and other educational resources. Countless other facilities are contributing to help diminish the effects of climate change through education, campaigning, fundraising and other means.

Public and Political Perception of Climate Change

When the general public thinks of climate change, they may think of images of polar bears searching for food on diminishing sea ice, but they may not realize the impact climate change has on the rest of the world or what zoos are doing to stop it. Sea ice is melting in both the Arctic and Antarctic, glaciers continue to melt worldwide and coastal

areas and rivers are flooding due to the rising seas (Jancaitis, 2007). Spring comes earlier in many areas, humidity is rising, and intense weather, such as hurricanes, blizzards and wildfires, are becoming increasingly common. The increased temperatures affects groundwater storage and can even hinder an airplane's ability to gain enough lift (Sharpe, 2017).

The debate over climate change is not a new issue, but renewed focus has been brought to it due to current political platforms and the ever-increasing extreme weather occurrences. Severe weather is a negative effect of climate change caused by the emission of greenhouse gases (Sharpe, 2017). Many greenhouse gases come from the burning of coal and oil. Despite the previously popular name "global warming," climate change does not simply warm up the earth, it causes significant weather, ocean and atmospheric problems. These problems can include warmer summers, colder winters, rising seas, coral reef death and abnormal storms. Climate issues affect not just the typical 'faces' of climate change, like polar bears, but everyone, including you and I. Humans

The debate over climate change is not a new issue, but renewed focus has been brought to it due to current political platforms and the ever-increasing extreme weather occurrences.

have instigated a major problem that our planet is facing and it is time to step up and start fighting against climate change.

Despite 70% of Americans believing in climate change, the United States currently has government officials denying climate change's effects (Nuccitelli, 2017). Some may be unwilling to set emission standards and other regulations which could result in potential negative effects on privately-owned businesses (Brewer, 2003). In addition, some often dismiss climate change as a natural cycle of the earth. In a survey involving 1,461 US adults, about 5% more people polled believed that climate change was real, but not

global warming (Schuldt, Cavalier & Enns, 2017). The term "global warming" appears to have caused some confusion among people. This is the term that was often used in the past, however more recently conservationists prefer the term "climate change" to avoid confusion of thinking that global warming only warms up the earth. The conversion of the term could help prevent confusion when climate change is associated with extreme winter temperatures and storms. In a 2016 Yale survey, over 50% of adults polled were in favor of policies that researched climate change and/or made greener regulations. Only 38% of these people believed that climate change would harm them personally (Marlon, Howe, Mildemberger & Leiserowitz, 2016). The findings of this study help to pinpoint how important it is to educate the public on the potential problems they may face, or are already facing, due to climate change.

What else can be done?

Despite the work already being done by zoos and aquariums, approximately one-third to two-thirds of zoo educators do not engage the public about climate change as much as they

would like to (Swim & Fraser, 2014). The lack of engagement is not due to educators being afraid of creating a potential debate, but the fear that the guests are not interested in the subject of climate change. As with any conservation education, if executed poorly, climate change has the potential to be an unstimulating subject. Zoo and aquarium educators are an important link to the general public, meaning something must be done to help conquer this challenge. Facilities (or even AAZK Chapters) can implement training that focuses on climate change to encourage confidence in talking to guests about the subject and inspire

new ways to deliver the information. These programs can be in the form of professional development classes to ensure that educators can articulate their message of climate change, as well as how to address instances where a guest debates climate change.

As the Earth continues to be affected by climate change, more species will be affected, as well (Junhold & Oberwemmer, 2011). As this happens, zoos and aquariums will have an increasing number of species in their collections that are affected by climate change in the wild. These facilities should develop climate-related educational programs that include more species than just those in the areas that are typically thought of as affected by climate change, such as the Antarctic, Arctic and ocean. Polar bears and penguins are an easy target to discuss when it comes to climate change, but what about the many other species that currently are being impacted by climate change? What about the coastal species that are now at risk from rising sea levels? Or the mountain species that will have to live with the changing climate in the higher elevations?

In the Rocky Mountains, Pikas are one example of a high elevation species at risk. Snowpack and cooler temperatures help pikas thrive in their alpine habitat. Climate change is putting pikas at risk to freezing and heat stress due to snowpack melting earlier each year and summer temperatures rising. By the end of the century, pikas in Colorado may see a population drop. In order to conduct research and spread the word about climate change in their local community, the Denver Zoo has partnered up with Rocky Mountain Wild to create the Front Range Pika Project (FRPP). FRPP has over 40 sites they are surveying in Rocky Mountain National Park and 125 volunteers helping conduct research on this local species (Denver Zoo, 2019). Many more species may soon be negatively impacted by climate change, including your local species. Unless zoo guests live in areas that are typically thought of when it comes to climate change, climate change may be an “out of sight, out of mind” event. The future of local areas needs to be considered when it comes to educating

zoo guests about climate change. Would a disinterested zoo guest suddenly care if they learned their favorite local bird may be one of the next victims of climate change? While charismatic animals such as polar bears and penguins are great subjects, focusing on more local species may help shed light on the problems within the visitors’ own community. Individual facilities should determine a way to make climate change “hit home” with their guests by figuring out how it will affect the temperature, weather, species and people in their community.

Through keepers, aquarists, educators, volunteers and social media platforms, zoos and aquariums have the ability to reach out to those who are unsure, confused or even in denial about climate change. Climate change is not just something seen on television or online, it is something that affects everyone and everything on this planet. Although zoos and aquariums have already begun to address the challenge of educating about climate change and inspiring action, more can always be done to help gain traction. Zoos and aquariums have an amazing platform to educate and create awareness to this ever-increasing problem that our world continues to face. Facilities and their staff can set examples of how to offset one’s carbon footprint, like Reef HQ in Queensland. Emphasis with help from visitors, zoos and aquariums can continue to support and fund research efforts. These efforts can be communicated to the visitors to emphasize how their visit to the zoo is helping save animals and their habitats in the wild. With zoo and aquarium influence, we may be able to see policy changes, as well as individual and institutional sustainability action. 

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Can Non-Sibling Male Fishing Cats BroExist?

*Kelsey Eggers and Molly Kainuma, Predators Keepers
Denver Zoo
Denver, Colorado*

Introduction

Fishing Cats (*Prionailurus viverrinus*), small felids found in Southeast Asia, are listed as vulnerable overall by the IUCN red list, but are already considered endangered in some localities. While much is still to be learned about this species, researchers confirm their population numbers are declining due to habitat loss, wetland pollution, and trapping for consumption or retaliation. Considered solitary, fishing cats seem to follow the typical felid occupancy pattern, in which

several females' home ranges are overlapped by one male (Small Cat Advocacy and Research). However, recent studies show evidence of more territory overlap with other cat species than previously recognized.

Similarly, the Fishing Cat SSP population faces a very common problem: lack of space. Although overall population numbers have increased over the past several years, the population

is still not considered sustainable. Low founder numbers, disease prevalence, and mate incompatibility contribute to the challenges faced by the *ex situ* population. A study of institutional transfers and breeding introductions recommended by the SSP between the years of 2010-2013 found breeding success to be only 13% (Fazio et al., 2018). Recent numbers show almost twice as many males as females in North American institutions, leading to a surplus of males that are almost exclusively housed alone once sexual maturity is reached. With a current population of 25.14, holding and exhibit areas are at a premium. It is unlikely that enough new holding spaces will be found to increase the population to a sustainable level, but as wild fishing cat numbers decrease, it is important for us to maintain a healthy population in zoos. Reaching the goal of a sustainable population requires individuals to breed often and with varied partners, often leading to multiple institutional transfers and numerous breeding introductions within a single individual's lifetime (Fazio et al., 2018). Fishing cats in zoos are usually housed alone or in breeding pairs, but perhaps innovative housing strategies could increase usable space and benefit the entire population.

Denver Zoo's breeding pair of fishing cats, Namfon and Ronaldo, had their first successful offspring, Miso-Chi, in the beginning of 2017. Like the majority of the fishing kittens born in zoos recently, Miso-Chi is a male. He would be added to the waiting list for a breeding recommendation as all of the breeding females in the population were already paired, but Denver Zoo did not have space to continue breeding while also housing Miso-Chi. Since females were in higher demand, the decision was made to send Namfon to pair with another breeding male. This left Denver Zoo with a father (Ronaldo) and son (Miso-Chi), which rotated holding areas and a single exhibit.

Initial Idea and Brainstorming

Although Ronaldo was separated from Namfon before parturition, the two males did have visual and howdy access to each other in the back holding. For two years, no negative interactions were observed, despite often eating right next to each other. There was awareness and curiosity between the two, but no aggression or concerning behavior. Although there was a lack of affiliative interactions, keepers began to wonder if they would tolerate each other, and potentially be enriched by each other, if they were housed together.

As we began to brainstorm the possibility of introducing two non-sibling male fishing cats, we considered Ronaldo and Miso-Chi's individual backgrounds. Ronaldo had been housed with Namfon successfully as a breeding pair. Keepers observed them sleeping and vocalizing together at night, but generally maintaining their own space during the day. Occasional warning aggression, such as hissing or raising of the paw, was seen around feeding times, but they always responded appropriately to each other. Ronaldo was separated from Namfon before she gave birth, but Miso-Chi remained with Namfon until he was about a year and a half old. Namfon displayed proper maternal behaviors, but as Miso-Chi got older, she became less tolerant of his presence.

Fishing cats in zoos are usually housed alone or in breeding pairs, but perhaps innovative housing strategies could increase usable space and benefit the entire population.

Miso-Chi quickly learned to read Namfon's behavior and respected her space. Because Miso-Chi and Ronaldo both had successful histories and displayed proper social behaviors when with Namfon, we were hopeful this would translate if we housed the two males socially. We knew other institutions had successfully housed sibling males with varying success, but a father and son pairing as adults hadn't been attempted or done successfully in AZA institutions.

We evaluated the potential risks and rewards of this innovative introduction. Housing them together would benefit the population, the individuals, and the guest experience. If successful, this strategy would also have implications for the SSP population by allowing the option to consolidate animals and leading to more spaces overall. Housing two fishing cats together would increase useable space and allow opportunity to display an increased variety of behaviors. This could create a more dynamic exhibit and increase guest awareness and

Non-sibling male fishing cats, Ronaldo (left) and Miso-Chi (right), on exhibit together at Denver Zoo.





Miso-Chi (right) approaching and investigating Ronaldo (left).

interest in the species as well. However, the introduction was risky as fishing cats have been known to seriously injure or kill each other. The team at Denver Zoo felt that the possible benefits and population-wide reward for this introduction was worth a try. We felt confident in our exhibit space and ability to separate the two cats if the introduction was not going well.

Behavioral Observations

With the hope of sharing the story of this introduction and its results with the zoological community, we designed a behavioral study to compare activity budgets, behavioral diversity, social interactions, and visibility before and after the introduction.

We predicted an increase in behavioral diversity once they were housed together as this would give them the opportunity to display social behaviors not observed with a solitary animal. We also wanted to evaluate any changes in visibility, which was heavily dependent on their shifting compliance and if they had access to the behind-the-scenes holding area. Lastly, we wanted to look at how their frequency of social interactions and their proximity to each other changed over time. We predicted an increase in affiliative behaviors and a decrease in agonistic

behaviors over time and as they got more acclimated to being with each other. We also hoped to see an increase in time spent at a closer proximity.

Once establishing our goals for the study, we created an ethogram. We reached out to Birmingham Zoo, which had previously housed two brother fishing cats together, to get an idea of what behaviors they observed and what we might expect. Because we had to make predictions about what their interactions might be, we made our ethogram very detailed and specific, including multiple categories and defining many behaviors. (Denver Zoo Fishing Cat Ethogram, Photos 6 - 7).

We initially designed a six-week study, with two weeks of baseline observations before the introduction and four weeks of observations after the introduction. After the initial six-week period, we planned to re-evaluate the study and assess frequency of observations moving forward based on our results. We used the ZooMonitor® program to record these observations.

continued on next page...

Study Length	2 weeks baseline, 4 weeks after introduction, re-evaluate
Session Length and Intervals	15-minute session with 45-second intervals
Observation Frequency	4 days per week, 3 times per day
Time Frames <i>(one each per day)</i>	7:30am-10:30am, 10:30am – 1:30pm, 1:30pm – 5:00pm
Behavior Modifiers	Proximity <i>(all behaviors)</i> and Intensity <i>(social behaviors)</i>

Introduction Plan

While working on the ethogram and behavioral observation study, the keepers also created an introduction plan. The plan included details specific to our area such as keeper roles, behaviors expected and behaviors that would determine

separation, and methods for separation if needed. We did our best to prepare for different scenarios, but with no experience of male fishing cat introductions, we knew a lot of decision making would come on the day of depending on what actually happened. Based on our knowledge of the two cats, we predicted that Ronaldo would be aggressive towards Miso-Chi, but Miso-Chi should submit and that would cease the aggression appropriately. We would separate the cats and end the introduction if aggression continued despite submission or avoidance from one of the cats or if any serious injuries were inflicted. Because this introduction was led by the team and not by other factors such as breeding priorities, we did not have any pressure or expectation for how long it would last or how much progress was made towards housing them socially. (Denver Zoo Fishing Cat Introduction Plan, Photos 8 - 11).

Initial Introduction

Overall, the first day of introductions were successful. Upon opening the door, the cats ran past each other with no reaction and settled in to their own spots in the back holding. After 45 minutes of no further interaction, the two cats got into their

Miso-Chi (bottom) and Ronaldo (top) hiding under enrichment together.





Miso-Chi (left) and Ronaldo (right) fishing for live tilapia on exhibit.

first tie-up. The cats were likely not active or investigating each other initially because of the abnormal presence of multiple keepers during initial introduction. The fishing cats are not used to more than two keepers in the holding at a time, and generally the keepers are only around for training and cleaning. The initial tie-up happened quickly, but they separated themselves once they heard the hose turn on.

After separating themselves, we left them together, and as we predicted, they found their own places to sleep and hide for the rest of the day. We saw further investigation from the two throughout the day, with hissing being the most aggressive behavior observed, and no resulting injuries from the introduction. We decided to separate the two overnight and reintroduce them the next day so we could further observe their interactions. The reintroductions the next day were uneventful, so we continued with this plan of them being housed socially during the day and separate overnight. During the day, we left them access to their holding area as well as the exhibit to give them space as they adjusted to each other. We continued with this plan for two months.

Throughout this initial two-month period, keepers occasionally found signs of physical interactions, such as hair clumps in the holding, but the cats never showed any sign of injury or increased hesitancy around each other. Keepers were

consistent with how they reintroduced the cats each morning and utilized an audio cue before the door was opened. Keepers also focused on building strong shifting behavior to the exhibit during this time, even though they would have access all day, to prepare for the next step of locking them on exhibit together. We did try leaving the cats together overnight once early on during these initial two months. A keeper stayed late to observe their behavior as we anticipated an increase in activity. As predicted, when the lights turned off, their behavior changed, Miso-Chi began to follow Ronaldo persistently which resulted in a tie-up. We decided to separate them after the tie-up and regroup as a team. We needed to look at smaller steps working towards an overnight and find ways for us to better monitor their behavior overnight. Because this introduction was elective, there was no pressure to how often they needed to be housed together.

Additional Steps and Goals

After the initial two-months went well, the team decided to move to the next step of locking the cats on exhibit together during the day. We had been practicing the shifting plan, which included feeding them both on exhibit at separate locations at the same time, to prepare for this step. The fishing cats historically had never been strong shifters, so being able to reinforce them both with their morning diet on exhibit, was key to this step working.

The transition to this step went smoothly, with the cats shifting consistently despite the change in access. We were able to secure them on exhibit each day, and continue to separate at night, making them more visible to guests and allowing us to better observe their behavior throughout the day. Once securing them on exhibit during the day proved successful, we began to work on making more usable space on exhibit for the two cats. Initially, we avoided using enrichment that created trapping locations, but as both cat and keeper-comfort levels increased, we added more enrichment that created secure hiding and resting locations for the cats. Hollow logs, cat towers, and other bench-like items were the most successful. We also added more perching to take advantage of the vertical space in the exhibit.

We continued to work on ways to make the exhibit more positive for the two cats by increasing the options for enrichment we could give when housed together. For example, offering live tilapia together. We started with smaller tilapia as they were less valuable to the cats and progressed to larger fish. We always gave at least three fish to give each cat a better chance of getting one. Although there were some days when one cat caught all the fish and the other did not get any, they defended their fish appropriately and no food stealing or fights resulted from this enrichment. Overall it was really successful for the cats and made a great guest experience.

As we continued the socialization, we encountered situations where the cats needed to be kept separate for various reasons, such as for routine urine collection. The cats continued to shift well after these days off and the reintroductions continued to be uneventful. This allows us flexibility in our housing options as we continue with this process. Now, if one of the fishing cats does not shift to the exhibit, that cat stays in the holding, while the cat that shifted is on exhibit. This increases our percentage of visibility even more because one cat is still on exhibit instead of housing them together and leaving them with access.

We will use this as a tool as we begin to explore overnights together with these two males. We can house the cats separately during the day, and introduce them later in the day as an approximation towards housing them overnight and for longer periods of time. If we find overnights together to be successful, we can use a fission/fusion type management to allow them time alone as well as together as we see fit.

Behavioral Observation Results

Our behavioral observations included the two weeks prior to the introduction, the first four weeks after the introduction when they had access to the exhibit and the holding, and eight weeks once they were locked on exhibit together. The results from the first four weeks after the introduction proved to be insignificant in addressing most of our questions because the cats were out of view the majority of the time (Miso 62% and

Ronaldo 85%). This piece was important though in addressing how the introduction affected their visibility.

Visibility

	BEFORE INTRODUCTION	AFTER INTRODUCTION
Percentage of time locked on exhibit	67%	92%
Percentage of time visible to public	Miso-Chi 74%, Ronaldo 73%	Miso-Chi 97%, Ronaldo 95%

Before the introduction, the fishing cats successfully shifted and were locked on exhibit 67% of the time. Because of this, they had access to the holding 33% of the time and were out of view 27% of the time. This increased when we were actively leaving them with access, but we recognized this would be a necessary step to work towards securing them on exhibit together. Once we began trying to lock them on exhibit together, they only had access due to non-compliance 8% of the time, which significantly decreased their time spent out of view (Miso 3% and Ronaldo 5%). This increase in visibility has created a better guest experience, with many guests noting that they had never seen the fishing cats out before.

Behavioral Diversity

Number of behaviors exhibited	BEFORE INTRODUCTION	AFTER INTRODUCTION
Miso-Chi	14	>24
Ronaldo	11	>24
New behaviors:	Social vocalize, displace, hiss, approach, allogroom, mount, and more	

Before the introductions, Miso exhibited 14 different behaviors and Ronaldo exhibited 11 behaviors. After the introduction the two cats were exhibiting 24 different behaviors, not including the behaviors that were recorded as ‘other’ during observations. New behaviors included both agonistic and affiliative social behaviors including: social vocalize, displace, chase, hiss, avoid, and allogroom. Behaviors that were recorded

as 'other' included mount, approach, investigating/smelling the other, and follow.

Activity Budgets

Behaviors listed in the ethogram were divided into different categories: Locomotor, Self-Maintenance, Other, Out of View, Affiliative Social, and Agonistic Social. As stated above, both cats' time spent out of view decreased significantly. Another significant change was Ronaldo's 'Locomotor' behavior category increased from 8% to 20%. His 'Self-Maintenance' behavior category also increased from 25% to 35% with keepers also anecdotally noticing an increase in Ronaldo's time spent grooming himself. Miso-Chi also exhibited an increase in the 'Locomotor' behavior category from 31% to 43%.

Interactions over time

We also looked at the frequency of agonistic and affiliative behaviors over time. As predicted, we saw a decrease in frequency of agonistic behaviors, of which swatting and hissing were the most common. Hissing and swatting have decreased from occurring frequently when the cats got near each other to only being exhibited when the cats are in specific situations such as protecting live fish they caught.

Tie-ups were infrequent and short-lived and never caught during observations, but as we continue to explore next steps, including overnights together, we anticipate these to continue to occur.

As the cats were together longer, we began to see new affiliative behaviors being displayed. These behaviors progressed in level of interaction over time from social vocalizing to following, playing, mounting, hiding together, and eventually, allogrooming. These behaviors began to increase in frequency and intensity over time, but overall, they spend an insignificant amount of their time engaged in these social behaviors.

Other Notable Results

There were also some notable results in their activity budgets on an individual behavior level. Miso-Chi exhibits a pacing behavior, that could be more accurately described as patrolling, that remained the same before and after the introduction at between 12% and 13%. Keepers observe that this behavior is consistent in the mornings when Miso-Chi is on exhibit and saw a correlation to strollers and wagons in the guest lobby of the building. Seeing that this level of pacing or patrolling remained the same after introductions, allow us to better

Ronaldo (left) resting and Miso-Chi (right) alert with a proximity of 0-2 feet on exhibit during behavioral observations.



understand a possible cause of this behavior and address it, feeling confident it is not a result of stress due to Ronaldo's presence.

'Alert' and 'Vigilant' were two similar behaviors in the ethogram, with 'alert' meaning the cat was stationary, awake, and aware. 'Vigilant' was defined as a more heightened awareness being focused on something. Although 'alert' may have a negative connotation, it is a comfortable and awake position, and it is what we expected to see a large majority of the cat's activity budget to include. When comparing these behaviors before and after the introduction, both cats showed an increase in time spent 'alert' and a decrease in time spent 'vigilant.'

Results Summary

There were no behavior changes shown through the behavioral observation results that concerned us or made us feel the cats are uncomfortable being housed together. On the other hand, we did see some trends and changes in activity budgets that we hypothesize could be due to an increased comfort when housed socially on exhibit. Historically, the fishing cats have been poor shifters and sensitive to noise, changes in routine or environment, and public presence. We hypothesize that the cats may be less hyper-aware and vigilant when together because they know where the other cat is or because they are more comfortable on exhibit when housed socially. We also see an increase in natural behaviors such as self-grooming, locomotion, and investigating environment, which could be a result of increased comfort. These could be a potential explanation to why their shifting compliance increased once they were housed together.

Future Steps

Overall, we feel like this introduction has been extremely successful and has shown benefits for the cats through enrichment, space, and behavioral diversity. It has also proven to enhance our guest experience and has increased our guests' interest in fishing cats in general. We still have many future steps we are working towards such as increasing time spent together overnight, exploring more food enrichment options such as

scatter feeds or ribs together, creating more permanent exhibit structures that will further increase the cats' comfort on exhibit, and working on improving shifting compliance and resilience.

In addition to the benefits this introduction has had for our individual fishing cats, there are benefits for the fishing cat SSP population as well. If other institutions are interested in trying introductions of non-sibling male fishing cats, it could increase the space in zoos available for breeding pairs of fishing cats. Evidence suggests that mate compatibility is fairly rigid in this species, finding no breeding success in pairs that were not observed copulating in their first year post-introduction. Because of this, a one-year trial period for sexually mature breeding pairs was suggested. In order to support this type of management, facilities with the ability to house more than one male or female in order to quickly swap pairs to determine compatibility would be highly beneficial (Fazio et al., 2018). The ability to house more than one male could increase animal welfare within the population by providing increased opportunities for socialization as well as offering more options for breeding success. In the future, it would be interesting to do a fecal cortisol study before and after introductions. It would also be valuable to see if introductions are successful when introducing males of different backgrounds and relatedness, for example two young unrelated males or two older males.

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Compassion Fatigue - The Silent Killer of Good Keepers

PJ Beaven

ZooFit

Puget Sound Chapter for AAZK

Seattle, WA

In an age where experts are telling society that sitting is the new smoking, and Nature-Deficit Disorder is a real malady which can be cured or at least treated by getting outside on a regular basis, zookeepers may feel we are the healthiest profession on the planet. Most zookeepers don't sit as much as they'd probably like (except when we're on light duty, and then all we want is to get up and be "useful"). And even if we work indoors with our animals all day, animal professionals get a very healthy dose of nature either while interacting with animals, interacting with exhibits, or connecting our visitors to animals through programs and presentations.

While zookeepers may not relate to the real harmful effects of sitting or being deprived of nature, there is one new trend which can put us flat on our backs- Compassion Fatigue. Compassion fatigue is not unique to zookeepers, although animal professionals are one of the top careers suffering from it. Other jobs which experience it are nurses, social workers, counselors, EMTs, and teachers.

According to Dr. Charles Figley, the director of Tulane Traumatology Institute, compassion fatigue is "an extreme state of tension and preoccupation with the suffering of those being helped to the degree that it can create a secondary traumatic stress for the helper." In other words, we end up caring too much.

Compassion fatigue is a serious threat to our livelihood. Besides causing apathy and depression, it is known to lead to substance abuse and in the worst case scenario, even suicide. Professionals often have a difficult time separating work from personal life. I had a difficult time doing it myself, although counseling and therapy definitely helped.

Many professionals, however, even with therapy, don't last long once compassion fatigue sets in. The most common result of this serious malady is zookeepers leaving the field, often

pursuing a career that doesn't take its toll on our bodies, or our psyches.

Losing caring people in the field due to bottling up emotions, letting work drift into personal lives, and overwhelming schedules with work-related issues doesn't have to be commonplace anymore. And counseling doesn't have to be our only option in fighting compassion fatigue.

Acknowledging and recognizing compassion fatigue is the most important first step. The next important aspect is taking care of ourselves. This isn't a vanity or even just a wellness act. When we take care of ourselves, we can take better care of our animals.

Zookeepers are the only people I know who think their animals need to come first. Here's a harsh reality: whatever you put in front of your own well-being as a priority, you will end up losing. Second. The first thing you lose is your own well-being.

I'm not saying if you don't care for yourself, you will end up killing your animals...although it's not a far-fetched idea. Getting stuck in your head can lead to missing critical cues your animals are telling you about their own health. Or missing crucial steps in ensuring their safety and well-being. Being so stressed out you call in sick repeatedly means you aren't there for the animals.

By taking care of yourself, you provide better animal care. It's really that simple.

But simple doesn't necessarily mean easy. We know that. Getting a weight or a blood sample are simple procedures, but that doesn't make training the behavior easy.

The top five best ways to care for yourself is to sleep better, eat better, move more (outside your incredibly active job), focus



1.

TALK TO YOURSELF AS YOU SWITCH FROM WORK-MODE TO OFF-WORK-MODE.

You can even tell yourself “Time to switch to off-mode”. Verbally recognizing the two different concepts helps your brain separate the two.



2.

IMAGES CAN BE USEFUL TO DIFFERENTIATE BETWEEN WORK AND NON-WORK.

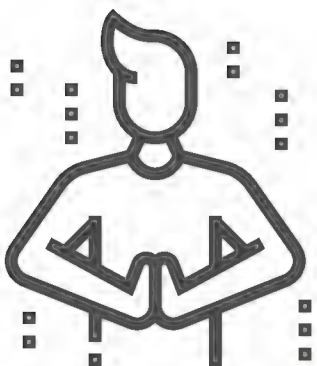
For instance, you may conjure images of feeling safe and protected while at work (all gates shut, all animals safe, or playing), and images of comfort and connection while away from work (talking on the phone, reading a book, eating a home cooked meal).



3

FIND A RITUAL OR ROUTINE TO HELP SWITCH FROM WORK TO PERSONAL, AND FROM PERSONAL TO WORK.

This can be a meditation or mantra you repeat as you leave work, or going to a neutral place which is neither work nor home (a gym is an EXCELLENT choice, or the grocery store, library, a park, etc...).



4.

PRACTICE BREATHING OR MEDITATING BEFORE YOU GO TO WORK, BEFORE A BIG DECISION, A DIFFICULT CHORE, OR WHEN YOU NEED TO RE-CENTER.

Focus and clear your mind. Let go of outside thoughts. It is also helpful to practice meditation daily, so when you NEED the benefits, it comes easier to you.

on the positive, and reinforce your efforts. Kind of like working with animals.

Getting plenty of sleep is the most important action we can take to improve our own wellness. Eating and moving are fundamentals for good health, but sleep is the foundation upon which nutrition and movement stand. Most of us are not getting enough sleep either. In his book *Why We Sleep*, Matthew Walker shows us that being sleep deprived is similar to being intoxicated. Getting good sleep every night is the key to good health.

Working out (in any capacity) outside our job will also help dramatically. Not only does exercise give us more energy, but it helps us focus, clears our mind, and improves our mood. John Ratey M.D, says exercise is “like taking a little bit of Ritalin, and a little bit of Prozac.” Even in cases where medication is necessary, doctors who prescribed exercise along with anti-depressants to patients who were depressed found they had longer-lasting episodes of hopefulness, positivity, and mental clarity, and often needed smaller doses of their anti-depressants.

The hardest healthy habit for zookeepers, and probably anyone with a break room or volunteers who bake, is eliminating junk food. Processed foods, especially foods with sugar and flour in them are wreaking havoc on our physical health. They also wreak havoc on our mental health. The roller coaster effect of highs and lows from eating sugar can actually increase symptoms of depression and addiction. Sugar is highly inflammatory, impacting our immune system and our brain. Inflammation is implicated in depression as well.

This is the toughest obstacle to overcome, fighting compassion fatigue with healthier eating. But the last two methods- focusing on the positive and reinforcing yourself- will definitely help conquer our addiction to junk food.

Remember positive reinforcement doesn't have to be food. Use activities which rejuvenate your soul to reward our healthy actions. Take a long bath after a hard day catching and weighing all the birds in the free-flight aviary. Allow yourself to watch an episode of a favorite show after resisting the donuts in the African Savannah office. Download that catchy tune you heard at the gym to reward working out.

Reflect on your day and make a point to really focus on what went well. It's not ignoring the aspects that didn't go well, but reinforcing the aspects we want to continue. The more we focus on the positive, the more we see the positives in our lives.

Taking care of our physical self is only part of the equation, we must also take care of our emotional side. Taking care of yourself means working on saying “no” at times, and leaving work at work. Again, simple, but not necessarily easy. The Professional Quality of Life Measure offers several useful ideas to helping separate the wonderful world of working with animals from our ordinary personal lives. Compassion fatigue can really drain us in a field where we care so much about our animals, our impact, and our planet. It is our passion and love which drives us to be zookeepers. But when we take that passion and help ourselves, we are stronger and better for it. Take care of yourselves, and be the best zookeeper you can be. 🐘

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Hierarchy of Safety Controls

Kathryn Juliano

Vice Chair of AAZK Safety Committee

Introduction

Animal keepers are always looking for ways to improve safety when working with dangerous animals. Some tools we can use include creating a positive safety culture and improving our own personal awareness. Another tool at our disposal is called the hierarchy of safety controls. This decision-making tool helps individuals determine how best to manage risks in the workplace. Developed by NIOSH, or the National Institute for Occupational Safety and Health, the tool has commonly been used in aviation, medicine, and construction. We can also use the tool to help us approach situations involving dangerous animals in the zoological field.

The hierarchy of controls includes five different categories of action, listed from most effective to least effective. The first two categories, elimination and substitution, are somewhat difficult to use in zoos and aquariums. The third and fourth categories, engineering controls and administrative controls, are frequently used and will be familiar to almost every keeper, even if they didn't previously know the technical terms. The last category, PPE, tends to be unreasonable when working with dangerous animals except in situations where physical restraint must be used. Understanding how these categories can be and have been applied in the zoological field can help decision makers approach risky situations more easily in the future.

When discussing mitigating risks in zoos, it is important to note that every animal carries an amount of risk and has the capacity to be dangerous. The goal of using a tool like the hierarchy of safety controls is always to reduce risk and danger, not to eliminate danger. Because animals are essential to our

facilities' missions and purposes and will always be kept in zoos, we will always face a degree of risk as animal keepers.

Elimination and Substitution

The first two categories in the hierarchy of controls include removing the risk entirely, and in the zoological field these are often not practical options. We cannot eliminate all animals that could be considered dangerous and substituting them for less dangerous animals would often stop our facilities from meeting their missions and goals. However, these options can be utilized when looking at specific situations. For example,

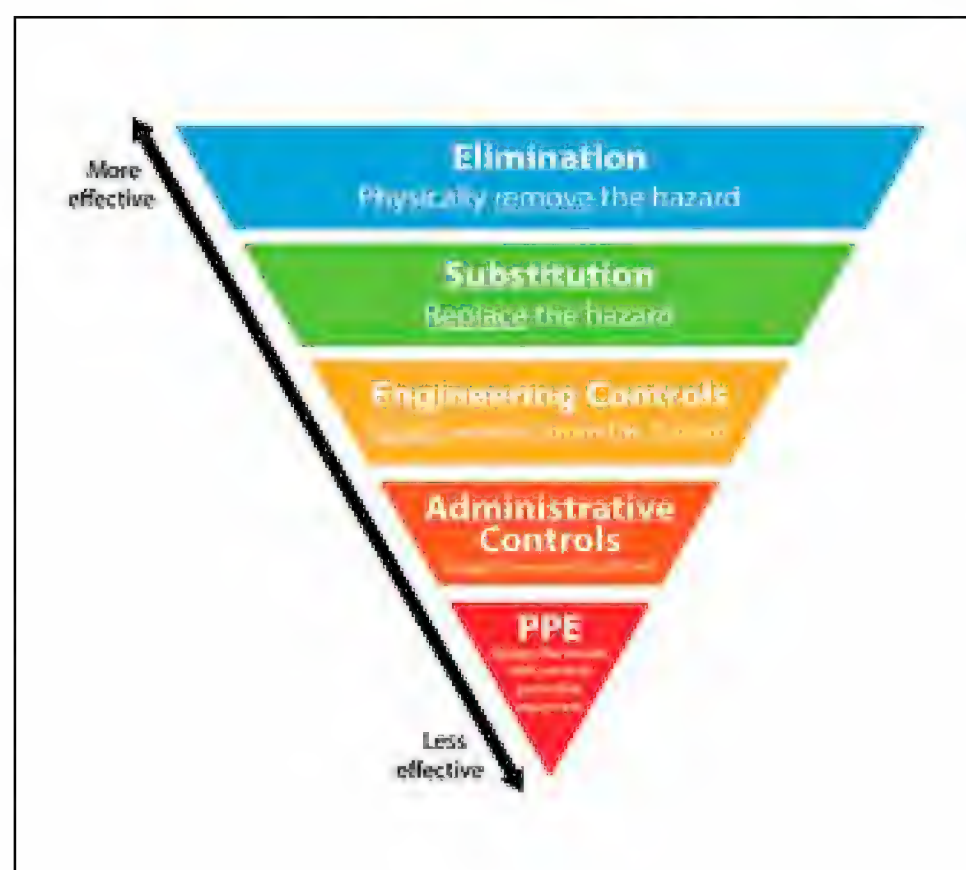
if an elephant has a habit of throwing rocks or branches at visitors, these items could be removed from its exhibit. If a gorilla attempts to hit keepers with bamboo, it could be given a different, more flexible type of browse in substitution for bamboo.

We can also eliminate risks by changing our handling method with animals. If we eliminate ourselves from the same space as an animal, we can instantly reduce risk in most situations. For example, working outside of an exhibit that contains orangutans or tigers is likely much safer. However, the increased human safety must always be balanced with other

changes to husbandry, care, or maintenance that could occur if keepers do not enter the same area as a specific animal.

Engineering Controls

If we cannot use elimination and substitution as viable courses of action in zoos when dealing with risk, according to the hierarchy of controls we must consider using engineering controls next. Engineering controls attempt to isolate people from a hazard by creating physical barriers. Ideally, these





Example of an engineered control: “Lock Out Tag Out” system.

controls are not subject to human error because they are part of the environment.

Two commonly used engineering controls include a “two lock, two key” system or a “lock out, tag out” system. “Two lock, two key” utilizes padlocks that require different keys from the rest of the locks in the area. If the system is set up appropriately, one individual keeper will be unable to enter an enclosure with a dangerous animal on their own. Similarly, “lock out, tag out” requires a keeper to use a padlock with a different key when entering a specific yard or enclosure. This system prevents another keeper from unintentionally moving an animal into the same enclosure as a person. When these two examples are correctly implemented, there is a physical barrier that prevents humans from unintentionally occupying the same space as dangerous animals.

Engineering controls can also be used in individual risk situations. For example, our rock-throwing elephant could receive exhibit modifications, like a net, to prevent items from being thrown into a crowd of visitors. The gorilla that hits keepers with sticks could also receive exhibit modifications to prevent further danger for keepers, like a board or mesh with smaller gaps. Any modification that physically isolates or protects the keeper from danger is considered an engineering control.

Administrative Controls

Administrative controls could be considered the bread and butter of zookeeping. These controls exist in the form of protocols, best practices, SOPs, and policies. Essentially,

administrative controls are methods that change the way people work to create a safer environment. The biggest challenge with administrative controls is that there will always be a degree of human error, unlike properly implemented engineering controls.

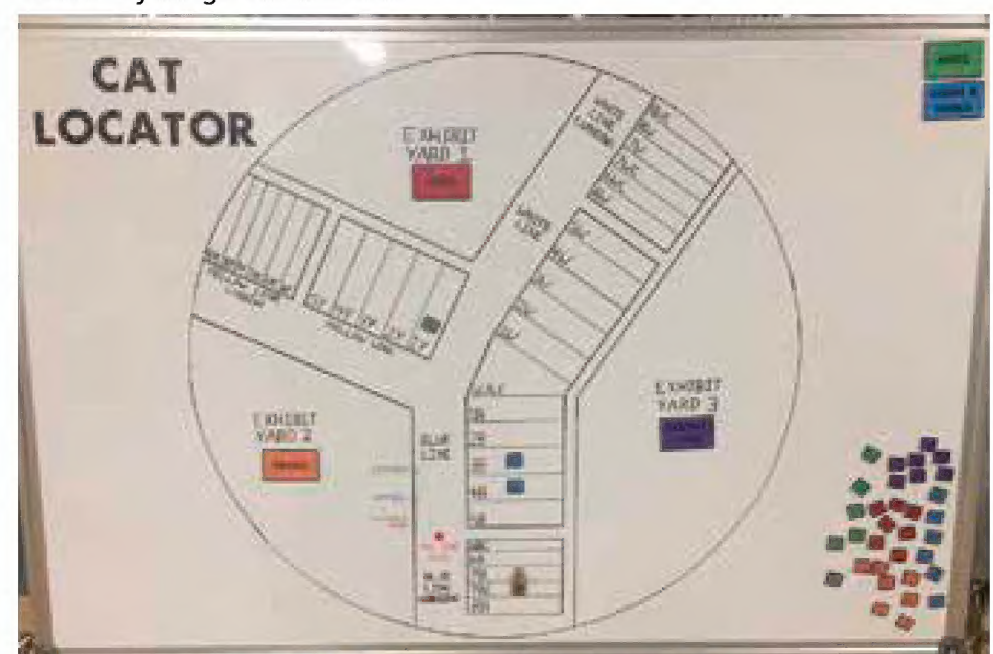
Some common administrative controls when working with dangerous animals include a two-person lock check policy, where a second person must verify that enclosures are secured before an animal is allowed to enter the area. A “head count” protocol requires one or two people to count animals in a group to ensure that an area is free of dangerous animals before a person enters the enclosure. Some zoos may require communication policies before moving dangerous animals, entering specific enclosures or areas, or training certain animals.

Administrative controls can also include tools and techniques used to increase awareness when working around dangerous animals. These can include different ways to highlight if a door is open or closed, including painting doors a different color, labelling door handles, or highlighting the inside of a door frame. Some techniques may highlight where a dangerous animal is located, including maps with moving icons, labels for doors, and signs around dangerous animal holding locations. Mirrors, bright lighting, and indicators to improve visibility are also considered administrative controls. These are only a few examples of administrative controls; many different techniques exist throughout zoos and aquariums in the country.

PPE (Personal Protective Equipment)

The final category of action within the hierarchy of controls is the use of PPE, or Personal Protective Equipment, to protect employees working in dangerous situations. This category of action should always be considered a last resort when using the hierarchy of controls. When working with dangerous animals, PPE is often not a viable answer. There is no PPE that could protect a keeper that enters the same space as a lion, for example. However, there are some tools we can equip ourselves with when physically handling animals, including long leather catch gloves, long pants and shirts, safety goggles or visors,

Example of an administrative control: Map to increase awareness of the location of dangerous animals.





Proper labeling of shift doors is another critical part of working with dangerous animals.

and steel-toed boots. Keepers can also wear bear mace as a last resort when working with large carnivores.

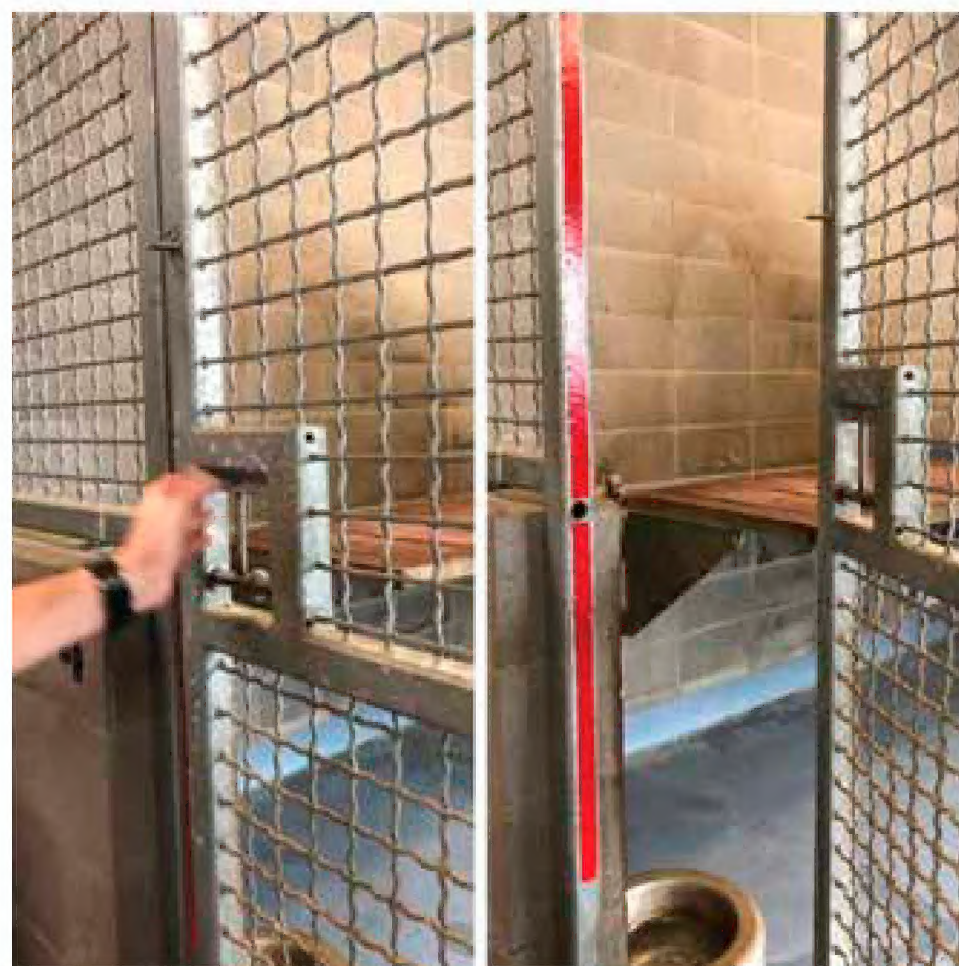
PPE could sometimes be considered useful in independent situations. Theoretically, a hard hat could provide a level of protection against an elephant that likes throwing rocks, and goggles and thick gloves could protect against a gorilla that tries to hit keepers with bamboo. In most cases, there will be many better courses of action to pursue before using PPE.

Applying the Hierarchy of Controls

When applying the hierarchy of safety controls to reduce risk, keepers and supervisors should be creative with possible options and consult each other, other departments, and other zoos. Because complete safety can never be achieved, good reason should always be used. For example, a reasonable decision maker may acknowledge that there will always be a level of risk present when working with large cats and try to balance administrative controls with the keepers' workloads and other concerns.

When applying the hierarchy of controls to a dangerous situation, decision makers should always consider options at the top of the matrix before utilizing options further down. However, because we work with living animals, the earliest possible option may not always be the best option in the zoological field. For example, the ultimate solution for our gorilla, according to the hierarchy of controls, should be to eliminate bamboo or other browse from the gorilla's diet. A reasonable decision maker may consult with their nutrition department and instead decide to install mesh with smaller openings, an engineering control, and continue offering browse to their department.

Finally, it is always important for an individual keeper to take part in their own safety. Any keeper can play a role in assessing risk within their job- they likely should take an active role as they are the individual facing danger. As a keeper, think about different risks within your job and different options that could make your job safer using the hierarchy of controls. Bring up concerns with your supervisor and talk with others in the field. The hierarchy of controls is just one tool that keepers can use to improve their own safety, with others including affecting the safety culture in your department and improving your personal awareness. Ultimately, each keeper must play an active role in their own safety. 🐘



Example of an administrative control: Tape to increase awareness of when a door is open or closed.

AAZK Safety Committee

The AAZK Safety Committee was created in 2016 with a mission of developing and exchanging resources for AAZK members in the promotion of safety and health. We coordinate continued education through presentations and workshops at the AAZK National Conference, educational articles in the *Animal Keepers' Forum*, and information shared through the AAZK social media accounts. We are always looking for new members who are also interested in sharing safety information with fellow animal care experts. If you are interested in joining the committee or have any questions, please e-mail safety@aazk.org.

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